JOURNAL

OF THE

ROYAL MICROSCOPICAL SOCIETY.

DECEMBER, 1915.

TRANSACTIONS OF THE SOCIETY.

VIII.—*On the Male Genital Armature of the Dermaptera. Part II.: Psalidæ.*

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Communicated by John Hopkinson, V.-P. R.M.S. (*Read May* 19, 1915.)

Plates X to XII and Figs. 58 to 64.

PSALIDÆ.

As Zacher remarks, the classification of this group is one of the most difficult of the taxonomic problems offered by the Dermaptera.

The best solution tendered yet is that of Zacher, based almost exclusively on the genital armature of the male; these certainly offer extremely valuable specific and generic characters, but he did not have sufficient material at his disposal to enable him to judge the relative value of the different features. He observes that very useful characters are afforded by the form of the pronotum, and of the antennæ, both of which are of generic value, of the structure of the end of the abdomen in the male, which offers both generic and specific characters; and he suggests two more which have not yet been properly examined in this group—namely, the size of the eyes and their distance from the posterior margin of the head-capsule,

EXPLANATION OF PLATE X.

FIG.
1. *Homœolabis maindroni* Bor.
2. *Titanolabis colossea* Dohrn.
3. *Labidurodes robustus* Dubr.
4. *Mandex peruviana* Borm.
5. *Psalis americana* Beauv.
6. *Psalis gagatina* Klug. (= *Carcinophora robusta* Scudd).
7. *Logicolabis vosseleri* Zacher.
8. *Anisolabis pagana* Burr.
9. *A. littorea* White.
10. *A. verhoeffii* Zacher.

and the bow of the post-frontal and length of the occipital sutures, to which we must add the shape of the sternal plates.

Zacher begins by dividing the *Psalidæ* into two groups, one with the virga developed, the other in which the virga is absent or aborted. This seems a very tempting arrangement, especially as the virga seems to be well developed in the American genera and absent from Old World forms. Unfortunately I am forced to the conclusion that the abortion of the virga is not only not correlated, as Zacher suggests, with brachypterism and apterism, but has no apparent connexion with geographical distribution, and is not a phylogenetic character. Not only is it developed in the Australian *Titanolabis* and its allies, but it occurs sporadically in several Indian and Ethiopian species which seem to have very close affinities with neighbouring species in which no trace of virga can be distinguished. It seems to me that in these cases it has not even the value of a generic character, yet I feel obliged to erect separate genera for those species which have a virga. The question is rendered more difficult by the fact that the virga is often difficult to discern ; thus in two mounts of *E. penicillata* there is no trace of virga in one specimen, but it is quite clear in another. In old and dried specimens, too, I am often in doubt whether certain structures are a virga or mere chitin-plates. I question, for instance, the identity of the virga in *Psalis* and in *Mandex* and *Metalabis*. Zacher fails to recognize it, and yet his figure shows it in *Logicolabis*, perhaps in his "*Eulabis dentata*," and in *Anisolabis verhoeffi*. In my specimens of the latter it is quite distinct.

I draw swords, too, with Zacher with regard to his statement, "wenn nun Burr sagt '*Carcinophora* seems to coincide with *Psalis*,' so hat er darin ganz offenbar unrecht, da nur *Psalis* eine Virga besitzt." He is here simply begging the question, for he relies on his own determination of a "*Carcinophora* sp." from Brazil, in the Berlin Museum, which has no virga. Now *Carcinophora* was erected by Scudder for *C. robusta* Scudd., which is only a brachypterous form of *Psalis gagatina*, congeneric with *P. americana* Beauv., the type of *Psalis*, and, as my figures show, the genitalia of the two species agree very closely, and both have a virga. *Carcinophora* is only applicable to brachypterous specimens of *Psalis*, and the creature from Brazil described by Zacher must belong to another genus. Oddly enough, he hardly refers to the genitalia: he says the præputial sacks have no chitin-plates, and he implies the absence of the virga, but makes no mention of the parameres. He states that the virga is absent ; in my specimens of "*C. robusta*" it is at least as well developed as in *Psalis americana*, but I question the identity of the structure, in both, and am inclined to regard it as a mere chitin-plate. In all other Psalids the virga is a simple delicate tube, a mere non-differentiated extension of the ejaculatory ducts.

Zacher certainly attaches an exaggerated importance to the armature of the præputial sack; the presence of various chitin-plates, denticulate pads, etc., may coincide with genera in some instances, but I am convinced that they have only specific value.

After a study of a considerable amount of material, I have come to the conclusion that the best characters are afforded by the metaparameres, which are of three main types, the long, medium, and short. The presence of elytra, whether rudimentary or not, seems to have little generic value.

The best specific characters are the shape of the pronotum, the form of the forceps, and, above all, of the ninth sternite of the male, or penultimate ventral segment, and the armature of the sides of the sixth to ninth abdominal segments in the male, and the sculpture of the abdomen.

The *Psalidæ* are rather heavily built, usually sombre-coloured earwigs, with a strong tendency to brachypterism and apterism; they are to be found under stones, logs, etc., and species are numerous in hot climates. As a rule, the area of each species is rather restricted, but two, *Anisolabis maritima* and *A. annulipes*, have become cosmopolitan.

The feature which characterizes the group is the great development of the manubrium of the male, which is seldom less than one and a half times, often three times, as long as the ninth sternite; it is narrow at the base, and dilated at the apex.*

The metaparameres have a kind of false membrane, very delicate and often difficult to see, and obscured by the præputial sacks when in erection; the blade is divided into two parts by a kind of midrib.

I take the opportunity of correcting a serious slip in my fascicule on the Dermaptera in Wytsman's "Genera Insectorum," p. 25, where in the table of genera of this group the *metasternum* is given as rounded in the *Psalidæ*, and truncate in the remaining groups: of course, for "metasternum" *mesosternum* should be read. This is true of all known genera of the *Psalidæ* except *Spondox*.

After a prolonged study of a considerable amount of material, I feel inclined to give up the task in despair; I can find no character which will allow the division of the *Psalidæ* into what appear to be natural groupings, nor to separate the New World from the Old World forms. I have drafted dozens of synoptical tables, only to destroy them afterwards in disgust; I have erected, in MS., dozens of new genera, only to reject them a few days later; and now I do not feel that I am one step nearer to finality than when I started. I am convinced that Zacher's arrangement cannot hold good; that many of his genera are founded on merely specific characters; that some of them may stand, but that others must go.

* Trans. Ent. Soc. London, 1915, p. 270, pl. xxxii.

Finally, I have settled upon a purely provisional arrangement, which seems to permit the grouping into sets of more or less allied species, which may, at least, be of assistance for the purpose of mere identification of species.

We can begin by eliminating those species in which the metasternum is not truncate posteriorly, but produced into a rounded lobe, this group containing Old World forms only; we may conveniently refer to them as the *Titanolabides*. The first genus, *Spondox* Burr (New Caledonia) has the mesosternum truncate, as in most other *Psalidæ*, but in the remaining genera, *Homœolabis* Bor. (India), *Titanolabis* Burr (Australia), and *Labidurodes* Dubr. (Papua), the mesosternum is lobed like the metasternum; all this group have a long, simple virga.

We can then conveniently separate the American group of *Psalides*, but it is hard to define them as a group; here the metaparameres are elongate, more or less dilated near the base, or short and broad, almost rectangular, always attenuate apically, usually acute; the metasternum is truncate, as in the remaining *Psalidæ*; probably a simple virga is always present, but I am unable to be positive in cases where I have only had old and dry specimens to examine. In this group we include *Heterolabis* Bor., for *H. brazilicnsis* Bor., a Brazilian apterous species recently described and figured by Borelli, with a prominent virga; *Psalis* Serv., *sensu stricto*, for the large fully-winged *P. americana* Beauv., *P. gagatina* Burm. (which includes the "*Carcinophera robusta*" of de Bormans, Zacher, Scudder, and other authors), for a new genus which I erect here for *Anisolabis peruviana* Bor., under the name *Mandex*, and another new genus for the smaller, fully-winged, brightly-coloured species of *Psalis*, of which *P. pulchra* Rehn is the type; *P. hænschi* Burr falls here, and perhaps *P. festiva* Burr, *P. nigra* Caud., and *P. rosenbergi* Burr. This genus I call *Spandex*. And, finally, it is necessary to make a new genus for *Eulabis saramaccensis* Zacher, since his genus *Eulabis* is to be restricted to certain Old World forms, as we shall see later. This new genus I call *Metalabis*.

We are now face to face with the problem of sorting out the numerous homogeneous species inhabiting various parts of the Old World, which have hitherto been collected together in *Anisolabis* Fieb., *Euborellia* Burr, *Gonolabis* Burr.

We must, I think, first divest ourselves of the idea that the features upon which those genera are based have any great value; *Euborellia*, with its rudimentary elytra, *Gonolabis*, with its posteriorly dilated abdomen, cannot stand as such, since, it seems to me, that these are features which are most probably due to convergence. For instance, *Mandex peruviana* Borm., from Peru, with its great size, restricted habitat, and knife-like metaparameres, is not to be ranged in the same genus with the little Oriental *Eubo-*

rellia ståli, with almost quadrate metaparameres, merely because both have the elytra reduced to small lateral flaps. Again, *Euborellia* itself, that is, in the old sense, contains two distinct groups, even if we pay attention to the reduction of the elytra only, that is, those like *E. ståli*, *E. pallipes*, etc., in which the elytra are reduced to mere lateral flaps soldered to the mesonotum, and the other group, *E. greeni*, etc., in which the elytra are decidedly reduced, but still meet along the suture, and conceal the whole, or almost the whole, of the mesonotum. In the same way, the apical dilation of the abdomen, the original characteristic of *Gonolabis*, occurs simultaneously in African, Asiatic, and Australian forms, which are not necessarily closely related, and have totally different parameres.

But yet, if we were to erect new genera for all the minor groups, arranged according to the shape of the parameres, we should end by having nearly as many genera as species, and it is necessary to choose the middle course. We can begin by dividing them into two main groups. The first has the metaparameres nearly or quite as long as the proparameres, more or less lanceolate, widest in the middle, and acuminate, three or four times as long as broad. We can at once eliminate *Mandex peruviana*, of which mention has been made already, with its unusually long and powerful metaparameres; then we eliminate *Anisolabis* Fieb., as restricted, with no virga. There remain in the group the Ethiopian *Logicolabis* Zacher, with long, fine virga, and armoured præputial sack; the Ethiopian *Anisolabis pagana* Burr, with unarmed præputial sack; and two Australo-Papuan species, *A. littorea* White (New Zealand), and the diminutive *A. verhoeffi* Zacher (New Guinea), both of which differ from *Anisolabis sensu stricto* in the presence of the virga. Perhaps each of the last three species will require its own genus!

We next come to the second major group, in which the metaparameres are decidedly shorter than the proparameres, and this group is subdivided in turn into one sub-group, in which the metaparameres are from one-and-a-half to three times as long as broad, and another where they are scarcely longer than broad. Both the divisions are subdivided again and again into a number of small groupings, which at one time I thought might be genera, but I shrink from the responsibility of creating so many new genera, and leave the synoptical table as drawn, and append some cross-groupings, which will, I hope, be of assistance as help-notes for purposes of determination, which is a difficult task, owing to the general similarity of appearance of so many members of the *Psalidæ*. Help-notes, not necessarily in a very scientific form, are often of greater use than carefully drawn dichotomic tables for purposes of identification.

With the object of making this paper more useful, I have

added the descriptions of one or two novelties, together with drawings of details of several species which have not hitherto been figured.

The slender build of the Hawaiian *A. perkinsi* Burr is easily recognized.

A certain number of Old World forms have the abdomen dilated towards the apex, so that the broadest part is the posterior margin of the tenth tergite; all these were previously ranged in the genus *Gonolabis*; to-day this genus is much restricted. Two species have been removed to *Eulabis* Zacher; these are the rare Javanese, *E. kirbyi* Burr, of which only two specimens are known, and the other the large and powerful *E. michaelseni* Burr from Western Australia; in both these the dilation is effected abruptly, so that the sides of the abdomen appear to be concave when viewed from above.

The single African species, *G. picca*, is removed to *Apolabis* on account of the form of the genitalia; the remainder are divided, according to the shape of the metaparameres, into *Mongolabis*, containing the three Australian species, and *Gonolabis* proper, with only Oriental species.

In *Gonolabis* proper the synonymy is rather confused; it is worth while, perhaps, repeating that *G. kükenthali* Zacher is the second known specimen of *G. javana* Borm., well characterized by the keel on the under surface of the ninth sternite of the male. *G. electa* Burr, from the Malay Archipelago and Ceylon, may be known by its small size and the proportionately very great dilation of the abdomen; *Mongolabis pacifica* Erichs., from Australia, by the dull, deep, pitch-black colour; *M. brunneri* Dohrn, of which *Gonolabis verhoeffi* Burr is a synonym, by the tooth on the top of the forceps.

The common Malayan, *G. oblita*, with a gradually dilated abdomen, is often mistaken for *G. javana* in collections, and was probably confused by Zacher, unless his *G. sumatrana* is really *G. oblita*; the true *G. sumatrana* is a relatively much larger insect, and of a deep chestnut-brown colour rather than black.

Certain species can be eliminated without difficulty, thanks to some well-marked character; such are *Anisolabella braueri* Zacher, from North-East Africa, in which the segments of the antennæ are extremely short and knotted; also *Anisolabis maxima* Brullé, which only occurs in the Canary Islands, and can be recognized by its length, the long forceps, and the tubercles on the tenth tergite of the male; also *A. owenii* Burr, from Liberia, in which the ninth sternite of the male is produced to a point in the middle; *A. incisa* Borelli, from West Africa, where the ninth sternite has a prominent triangular incision at the apex.

Some species have a fairly well-marked personal appearance, the expression, so to speak, which once seen, can always be recog-

nized, either from actual specimens, or from a good figure; such are *A. felix* Burr, *A. westralica* Burr (Western Australia); *A. littorea* White (New Zealand); the very small *A. verhaffi* Zacher, from New Guinea; the rather stout little *A. hottentotta* Dohrn, from South Africa; the elegant *A. læta* Gerst, from East Africa; the rich claret-coloured and large *A. gestri* Borelli, from West Africa; the sturdy *A. kudagæ* Burr, from Ceylon. In most instances, the area of distribution is fairly limited, and this is a great help.

The shape of the ninth sternite of the male affords some very useful characters, both for classification and for determination. As a rule, it is only the apical portion, or actually the outline of the posterior margin which is described; properly the sternite should be dissected out, and the shape of the entire plate recorded and illustrated, with the manubrium adhering. The shape of the sternite in several species is illustrated in my paper on the manubrium; for monographic work it is important that this be done in every species. I am sure that the difficulty of determining species will thus be greatly facilitated; meanwhile, the following notes will be helpful. Owing to the fluctuating state of the genera, generic names are omitted from this list.

Grouping according to the form of the 9th Sternite of the Male.

Acute—*Owenii* Burr.

Emarginate—

Horvathi Burr.
Verhoeffi Zacher.
Kudagæ Burr.
Incisa Bor.
Marginalis Dohrn.

Truncate—

Westralica Burr.
Occidentalis Kirby.
Littorea White.
Maritima Bon.
Tumida Bor.
Turgida Burr.
Pagana Burr.
Quærens Burr.
Dubronii Kirby.
Infelix Burr.
Rufescens Kirby.
Vosseleri Burr.
Braueri Zacher.
Felix Burr.
Woodwardi Burr.
Pacifica Erichs.
Vicina Burr.
Æthiopica Burr.
Kristenseni Burr.
Gestri Bor.
Læta Gerst.
Compressa Bor.
Tellinii Bor.
Maxima Brullé.
Annulipes Luc.
Saramaccensis Zacher.
Brunneri Dohrn.

In the males of some species, the sides of some of the abdominal segments, usually the seventh, eighth and ninth, but sometimes the sixth, and even the fifth, show a characteristic sculpture; these are often produced into an acute point, and more or less corrugated and rugulose, sometimes with a sharp and well-marked keel running down into the point. The point of the ninth segment usually corresponds with a lateral keel or crest on the tenth tergite, and then with the external keel or ridge of the forceps.

Sides of the 5th, 6th, 7th, 8th, and 9th Abdominal Segments of the Male.

Acute—

Westralica Burr.
Festæ Bor.
Tellinii Bor.
Mauritanica Luc.
Læta Gerst.
Compressa Bor.
Annulipes Luc.
Maxima Brullé.
Maritima Bon.
Littorea White.
Dubronii Kirby.
Infelix Burr.
Verhœffi Zacher.
Horvathi Burr.
Pervicina Burr.
Tumida Bor.
Angulifera Dohrn.
Isomorpha Bor.
Incisa Bor.
Silvestrii Bor.
Addita Burr.
Saramaccensis Zacher.
Sumatrana Borm.
Marginalis Dohrn.
Brunneri Dohrn.
Pacifica Erichs.
Owenii Burr.
Vicina Burr.
Æthiopica Burr.
Kristenseni Burr.
Hottentotta Dohrn.
Braueri Zacher.
Felix Burr.
Woodwardi Burr.

Sides of the Abdomen of the Male not Acute.

Perkinsi Burr.
Xenia Kirby.
Occidentalis Kirby.
Marginalis Dohrn.
Kudagæ Burr.
Turgida Burr.
Quærens Burr.
Pagana Burr.
Silvestrii Bor.
Infelix Burr.
Vosseleri Burr.
Gestri Bor.
Atra Bor.
Picea Bor.

The *Psalidæ* can thus be divided into two groups of very unequal proportions. The first, the *Titanolabides*, contains those genera in which the sternal plates are lobed posteriorly; these are four in number, occurring partly in the Oriental, but mainly in the Australian regions.

The remaining division contains all the other *Psalidæ*, and these, unfortunately, cannot be divided conveniently by any external feature, nor by any geographical feature. We have to

eliminate from our mind any idea that the development or reduction of the organs of flight is of taxonomic value; and secondly, that even the presence or absence of the virga, a feature to which Zacher, not unnaturally, attached great importance, has very great value. There are, indeed, cases where it seems to have only specific value, as, for instance, in the separation of *Anisolabis pagana*, *A. littorea*, and *A. verhoeffi* on the one hand, from *A. maritima*, *A. mauretanica*, and *A. kudagæ* on the other.

The best way, so far as I can at present see, to divide the rest of the *Psalidæ* is according to the length of the metaparameres; this has, at all events, the merit of convenience, and the results do not appear to be very unnatural. In the first group, the metaparameres are elongate, decidedly longer than broad, and therefore

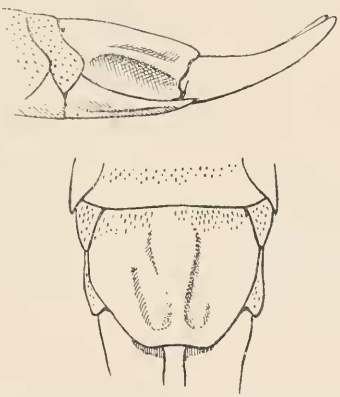


Fig. 58.—*Anisolabis isomorpha* Bor. ♂. Apex of abdomen (from a specimen from the Cameroons, in the Berlin Museum).

relatively narrow, often extremely so. In the second group, these segments are of moderate length, from one-and-a-half to three times as long as broad; and, finally, the third group, in which they are of about equal breadth and length.

I have long since come to the conclusion that the presence of chitinous pads, denticulate plates and so on, in the præputial sacks has only specific value, and that such of Zacher's genera as are based solely upon them cannot stand.

For purposes of convenience, the tables of the genera of each of these four groups is given separately.

The West African species of *Anisolabis* are rather numerous, and difficult to distinguish.

A. turgida Burr, *A. quærens* Burr, *A. pagana* Burr, and *A. silvestrii* Bor., form a group with the abdomen very nearly smooth. In *A. owenii* Burr, *A. tumida* Bor., *A. isomorpha* Bor. (fig. 58), and *A. incisa* Bor., the punctulation of the abdomen is much stronger.

The sides of the sixth to ninth abdominal segments are acute in the males in *A. tumida*, *A. turgida*, *A. isomorpha*, *A. owenii*, and *A. incisa*, and *A. silvestrii*; they are also carinulate in all these except *A. turgida*. The sides are rounded in *A. pagana* and *A. quærens*.

The ninth sternite of the male affords useful characters; it is sharply excised in *A. incisa*; it is more or less truncate, with converging borders, in *A. silvestrii*, *A. pagana*, and *A. tumida*; it is broadly rounded in *A. turgida*, and broad, with a sharp point, in *A. owenii*.

A. atra Bor. is not known to me.

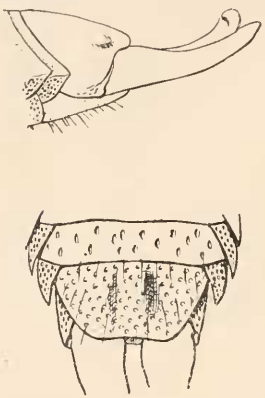


Fig. 59.—*Anisolabis angulifera* Dohrn, ♂. Apex of abdomen.

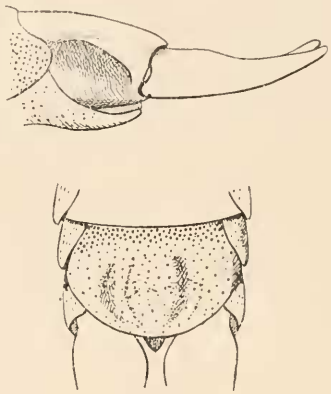


Fig. 60.—*Anisolabis quærens* Burr, ♂. Apex of abdomen (lateral and ventral view).

It is not yet certain to which form we are to refer *A. pluto* Rehn, and *A. angulifera* Dohrn (fig. 59); the former is a smooth species, and might be the female of *A. quærens* or *A. pagana*; the type seems to be a little too big for *A. tumida*.

Anisolabis quærens Burr sp. n. (Fig. 60.)

Very close to *A. turgida* Burr; differs in the absence of tubercles on the tenth tergite of the male, and in the rounded sides of the sixth to ninth segments of the abdomen of the male; the lateral keels of the tenth tergite are a little more acute.

Male.—Length of body, 11 mm.; ditto forceps, 2·25 mm.

Range.—West Africa.—Congo, Mundane, 1 male (Conradt, in Berlin Museum).

Genitalia not yet observed.

First Group.—Titanolabides.

In which the mesosternum usually, the metasternum always, are produced posteriorly into a rounded or tongue-shaped lobe.

1. Mesoternum truncate; (metaparameres elongate and parallel-sided; virga simple; apterous; New Caledonian genus) . . 1. *Spondox* Burr.

1, 1. Mesoternum lobed posteriorly.

2. Metaparameres narrowed at tips; virga short; (elytra rudimentary; præputial sack unarmed; Indian genus) . . 2. *Homœolabis* Bor.

2, 2. Metaparameres parallel-sided, evenly rounded at tips; virga long.

3. Metaparameres much shorter than proparameres, gently arcuate, emarginate at tips; apterous, præputial sack unarmed; Australian genus) . . . 3. *Titanolabis* Burr.

3, 3. Metaparameres about as long as proparameres, straight, entire at tips; (præputial sack with chitin-plates; fully winged; Papuan genus) . . . . . 4. *Labidurodes* Dubr.

Genus *Spondox* Burr.

Corpus apterum; mesosternum postice truncatum, metasternum lobatum; metaparameres angusti recti, apice rotundati, æque longi quam proparameres; virga longa, subrecta.

Totally apterous; mesosternum posteriorly truncate; metasternum lobed; metaparameres about as long as proparameres, straight, narrow, rounded at the tip; præputial sack with chitin-plates; virga long, almost straight.

For the single species, *S. sarasini* Burr, from New Caledonia.

Allied to *Titanolabis*, but differs in the truncate mesonotum, and form of the genitalia, as shown in the table.

Genus *Homœolabis* Borelli.

This genus was separated from *Euborellia* by the lobed meso- and metasternal plates, thus approaching *Titanolabis*; in general appearance, stout and contiguous forceps, it is also allied. The form of the genitalia confirms the view of its relationship. The

metaparameres are nearly as long as the proparameres, long, rather narrower at the apex than at the base, and rounded at the tip. I can detect a portion of the virga looped near the base of the præputial sack.

It contains only the Indian *H. maindroni* Bor. (Pl. X, fig. 1).

Genus *Titanolabis* Burr.

This genus is well characterized by the metaparameres, which are shorter than the proparameres, gently curved, and rounded at the apex, with a slight dilation on the inner margin near the apex. The virga is very long, and simple.

It contains only the gigantic Australian, *T. colossea* Dohrn (Pl. X, fig. 2).

Genus *Labidurodes* Dubr.

This genus remained unknown since the original description of Dubrony in 1879 until quite recently. It is practically a fully-winged *Titanolabis* with lobed meso- and meta-sterna. The genitalia agree; the metaparameres are as long as the proparameres, narrow, and rounded at the apex. The præputial sack has chitin-plates near the apex, and the virga is long, looped at the base and coiled at the apex.

The only known species is the Papuan *L. robustus* Dubr. The so-called *Labidurodes* of Shiraki certainly do not fall here; probably most of them are Eudermaptera, and the two or three species described some years ago by myself urgently need re-examination; probably they have no relation at all with *L. robustus* (Pl. X, fig. 3).

Second Group.—Psalides.

In which the metaparameres are from three to four times as long as broad.

This group at first sight does not seem to be a very natural one; but *Mandex* is only a *Psalis* with the elytra strongly recued to mere lateral flaps, that is, externally, for the parameres are of a very distinctive form. *Anisolabis* differs little from *Psalis* in the genitalia, and externally is only an apterous *Psalis*, as I have previously maintained; *Logicolabis* is a slightly modified *Anisolabis*.

I feel constrained to accept the reduction of the virga here to be only of sub-generic rank.

1. Metaparameres narrow at base, broadest in the middle, acuminate at the tips; (elytra rudimentary; Neotropical genus) . . 1. *Mandex* g.n.

1, 1. Metaparameres approximately parallel-sided, not acuminate.

2. Virga indurated; (winged or brachypterous; Neotropical genus) . . 2. *Psalis* Serv.

2, 2. Virga not indurated, or absent.

3. Pygidium fused with tenth tergite; (apterous; Ethiopian genus) . 3. *Logicolabis* Zacher.

3, 3. Pygidium not fused with tenth tergite; (apterous; Palæotropical genus) . . . . . 4. *Anisolabis* Fieb.

Genus *Mandex* g. n.

Corpus apterum; elytra rudimentaria; metaparameres triplo longiores quam latiores, sensim acuminati, basi dilatati.

Apterous; elytra present as lateral flaps; metaparameres more than three times long as broad and acuminate, broad at base, gradually narrowing towards the apex; præputial sack armed with teeth and chitin-plates.

This genus is formed for *Euborellia peruviana* Borm.

Unfortunately, I have only old and dry material, but the virga seems to be short, straight and rather broad; the præputial sack has a strong chitinized armature, the details of which are obscure. The metaparameres are long, broad at the base, and regularly tapering to an acute point.

M. peruvianus Borm., from Peru, is the only known species (Pl. X, fig. 4).

Genus *Psalis* Serv.

Zacher had very little material to work upon; he states that in *P. americana* the virga is gently sinuate and longer than the metaparameres, which are acuminate. My figure shows that they are rather blunt at the tip; what is apparently the virga of Zacher is distinctly seen in my figure. I am inclined to think it is a mere chitin-plate. A similar structure is seen in the allied "*Carcinophora robusta*" (= *Psalis gagatina*), where the metaparameres are rather more pointed, and a little broader.

The smaller Neotropical species are probably all to be removed to *Spandex*, and the Palæotropical species fall into new genera (Pl. X, figs. 5 and 6).

Genus *Logicolabis* Zacher.

In *Logicolabis* I am unable to detect the "*S-förmige Verdickungsplatte*," described and figured by Zacher. As in his figure, both my specimens are in erection, and in the extruded præputial

sack of one there is a distinct tube ending in a spiral, which for me is nothing more or less than a virga; my second specimen is too darkly stained to show much detail, but there protrudes from the end of the præputial sack the long, slender apex of the same tube, and I can just detect a loop, which must be part of the same thing. Indeed, Zacher himself figures a long protruding thread, which can but be the same part.

The genitalia show a remarkable resemblance to those of *Labidurodes*, but the structure of the sternal plates is different.

We may leave this genus as good, at least for the present (Pl. X, fig. 7).

Genus *Anisolabis* Fieber.

This unwieldy genus must be restricted to those species which most nearly approach the type *A. maritima* Bon. My chief difficulty in doing this is that I can see a distinct virga in several species which are otherwise very close to *A. maritima*, and this seems a very important feature. Zacher, indeed, employed it to divide the *Psalidæ* into two main groups, those with, and those without, a virga, but this cannot hold good; he makes no mention of any virga in *A. verhoeffi*, which he figures and describes himself, yet I found the virga quite distinct in some of his original specimens, to which I had access. This suggests that the virga is in an unstable condition in this group, and may possibly be present in some individuals and absent in others of the same species.

I use the presence of the virga to subdivide the now restricted genus into two groups, as I do not want to make new genera unless I feel obliged. The chief feature of *Anisolabis*, as restricted, is the elongate, almost parallel-sided, apically rounded metaparameres. All members are totally apterous, and inhabitants of the Old World.

The few species which I retain in the genus can be easily distinguished as follows:—

1. Virga present.
   2. Metaparameres decidedly narrowed at the tips (New Zealand species) . . . . 1. *Littorea* White.
   2, 2. Metaparameres not narrowed at the tips.
      3. Metaparameres very narrow, straight; very small; (Papuan species) . 2. *Verhoeffi* Zacher.
      3, 3. Metaparameres gently sinuate, not very narrow; medium-sized; (West African species) . . . . 3. *Pagana* sp. n.

1, 1. Virga absent; (metaparameres not narrowed at tips) . . . . . { 4. *Maritima* Bon. 5. *Mauritanica* Luc. 6. *Kudagæ* Burr.

The last three can be separated by external characters, as indicated in other works. The metaparameres are straight, very gently widened about the middle, and gently narrowed at the tips, in

A. maritima and *A. mauritanica*; in *A. kudayæ* they are gently sinuate, as they are also in *A. pagana*. They are notably straight and narrow in my specimens of *A. verhoeffi*, but this is not clearly shown in Zacher's figure; my specimens were from the same tube and locality as Zacher's type (Pl. X, figs. 9 and 10, and Pl. XI, figs. 1 and 2).

Anisolabis pagana sp. n.

Allied to *A. turgida* Burr and *A. quærens* Burr; differs from the former in the rounded sides of the sixth to ninth segments of the abdomen of the male; from both in the more strongly punctu-

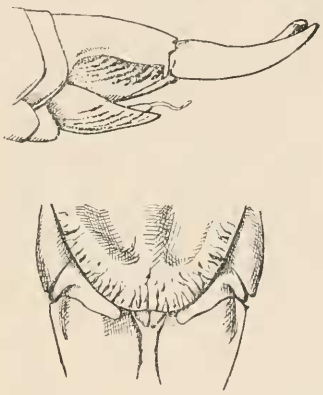


Fig. 61.—*Anisolabis pagana* Burr, ♂ type. Apex of abdomen.

late, and narrowed ninth sternite of the male, with truncate apex; in common with both, the segments of the abdomen are almost smooth

Male.—Length of body, 10·5 mm.; ditto forceps, 2·75 mm.

Range.—West Africa: Cameroon, two males (in Berlin Museum) (Pl. X, fig. 8).

Third Group.

In which the metaparameres are of intermediate length. This group is a difficult one, as it is almost impossible to resist the temptation to make too many genera; for a second time, I am obliged to treat the presence of the virga as of mere subgeneric or specific character, and in two instances at least we have apparently dimorphism in the shape of the metaparameres.

The first few genera have the metaparameres acuminate, whereas in the remainder they are blunt, or rounded at the tips, or merely narrowed, sometimes to a blunt point, but not acuminate; sometimes they are of about equal breadth almost to the ends, and then

terminate rather abruptly in a small point, or snout. The arrangement is not very satisfactory; in *Gonolabis* we have an approach to the form of *Mongolabis*, in which also the same form of the abdomen appears.

It will be noticed that I place in one genus the full-winged "*Psalis*" *dohrni*, the apterous *A. owenii* and *pervicina*, and the *E. greeni*, with much reduced rudimentary elytra.

The following arrangement is suggested:—

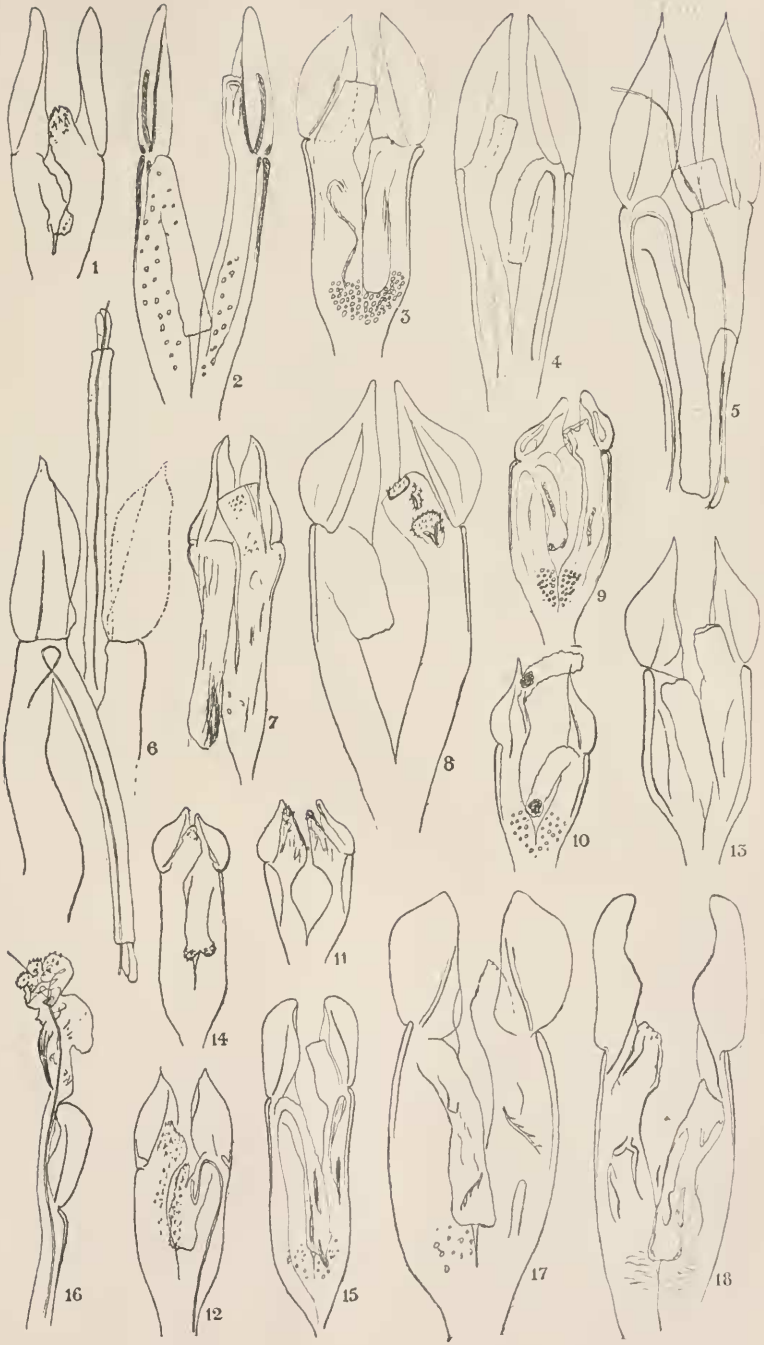
1. Metaparameres acuminate.
   2. Metaparameres broadest in middle.
      3. Abdomen ♂ strongly dilated posteriorly; (apterous; Oriental and Australian genus) . . . 1. *Eulabis* Zacher.
      3, 3. Abdomen not strongly dilated posteriorly; (fully winged or brachypterous; Neotropical genus) . 2. *Spandex* g. n.
   2, 2. Metaparameres broadest at the base or quite near it; (apterous genera).
      3. Metaparameres broadest at the base itself, then narrowing, externally bisinuate; (Neotropical genus) . 3. *Metalabis* g.n.
      3, 3. Metaparameres broadest just beyond the base; external margin sinuate; (Old World genus) . 4. *Apolabis* g. n.

1, 1. Metaparameres not acuminate.
   2. Metaparameres rounded at tips.
      3. Metaparameres broadly rounded at tips; (elytra rudimentary; Indian genus) . . . . . 5. *Epilabis* g. n.
      3, 3. Metaparameres gradually narrowing to the tips, which are rounded by the convexity of the external margin; (African and Oriental genus) . . . . . 6. *Paralabis* g. n.
   2, 2. Metaparameres ending at the tips themselves in a small point or snout; (apterous).
      3. Abdomen broadest before the apex 7. *Gelotolabis* Zacher.
      3, 3. Abdomen broadest at the apex itself; (Oriental genus) . . 8. *Gonolabis* Burr.

EXPLANATION OF PLATE XI.

FIG.
1. *Anisolabis kudagæ* Burr.
2. *A. mauritanica* Luc.
3. *Eulabis kirbyi* Burr.
4. *E. michaelseni* Burr.
5. *Spandex pulcher* Rehn.
6. *S. hænschi* Burr.
7. *Metalabis saramaccensis* Zacher.
8. *Apolabis picea* Bor.
9. *A. vicina* Burr.

FIG.
10. *Apolabis hottentotta* Dohrn.
11. *A. turgida* Burr.
12. *A. isomorpha* Bor.
13. *A. læta* Gerst.
14. *A. marginalis* Dohrn.
15. *Epilabis penicillata* Bor.
16. Ditto, ditto.
17. *E. sisera* Burr.
18. Ditto, ditto.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Genus *Eulabis* Zacher.

Apterum; abdomen ad apicem valde dilatatum; forcipis bracchia ♂ valde remota; metaparameres lanceolati, margine externo, convexo; virga adest.

Apterous; abdomen ♂ strongly dilated apically, the tenth segment being the widest; forceps with branches ♂ very remote at base; metaparameres lanceolate, at least four times as long as broad, gradually attenuate, external margin convex; præputial sack with no chitin-plates, and no teeth discernible; virga weak.

Type.—*Gonolabis michaelseni* Burr.

Range.—Western Australia and Java.

This is evidently what Zacher figures as *Eulabis dentata*, and refers to in the text as *Gonolabis woodwardi* var. *dentata* Burr, where *woodwardi* must be a *lapsus calami* for *michaelseni*.

The form of the metaparameres is quite distinct from that of the Neotropical *Eulabis saramaccensis*; this and the very different form of the abdomen amply justify the separation of that American species into a distinct genus.

I have been able to examine the genitalia of one of my original syntypes of *Gonolabis michaelseni*. The metaparameres are indeed acute, but not so narrow at the apex as those figured by Zacher; both margins are gently convex, and the tips pointed, but not abruptly attenuated. I can detect no chitinous plates, nor teeth (Pl. XI, fig. 4).

This genus must also include the rare Javanese *Gonolabis kirbyi* Burr; only two specimens are known, both in my collection. The metaparameres are about three times as long as broad, widest in the middle, and acuminate.

We may neglect the *nomina nuda* of Verhoeff, referred to by Zacher, namely *E. kamerunensis* and *E. polita* (Pl. XI, fig. 3).

Genus *Spandex* g. n.

Elytra et alæ perfecte explicata; metaparameres haud triplo longiores quam latiores, abrupte attenuati, apice acuminati.

Fully winged; generally resembles *Psalis*, but the metaparameres are acute at the tips, rather abruptly attenuate, and not three times as long as broad; the præputial sack is unarmed; virga gently sinuate.

This genus removes from *Psalis* proper some of the smaller species, as *P. pulchra* Rehn., which I take as type, and the very distinctive *P. hænschi* Burr. Probably also *P. rosenbergi* will fall in here, and perhaps *P. festiva* Burr and *P. nigra* Caudell (Pl. XI, figs. 5 and 6).

Genus *Metalabis* g. n.

Eulabis Zacher (1911), p. 377 (partim.).

Apterum; abdomen paullo dilatatum; forcipis bracchia ♂ subremota; metaparameres apice acuminati, 2½ longiores quam latiores, margine externo bisinuato, interno convexo, apice ipso recurvo.

Apterous; generally resembles *Anisolabis*, but forceps ♂ subremote and feebly asymmetrical; abdomen feebly dilated, attaining maximum width at the eighth segment. Metaparameres about two and a half times as long as broad, externally bisinuate, internally concave; strongly narrowed, acute apically, the tips slightly recurved; præputial sack with chitin-plates and two rows of teeth.

Type.—*Eulabis saramaccensis* Zacher.

Range.—South America (northern portion).

This genus is formed for *E. saramaccensis*, the only described species. The metaparameres are figured by Zacher. They are really of the same type as in *Spandex*, from the same countries; and this genus in fact only differs from *Spandex* in the entire absence of the organs of flight.

I possess this species from Dutch Guiana and Trinidad. In one specimen, an old and dry one, I can detect the ejaculatory duct at the entrance into the præputial sack, and on the other side, a very faint remnant of the virga at the apex of the sack. Very probably in fresh specimens the virga will be more easily discernible. (Pl. XI, fig. 7).

Genus *Apolabis* g. n.

Apterum; abdomen modice dilatatum; forcipis bracchia ♂ subremota; metaparameres modice longi, prope basin latiora, tum attenuati, apice acuti, margine externo sinuato, interno sæpius recto, apice haud recurvi.

Apterous; abdomen moderately dilated; branches of the forceps ♂ remote or subremote; metaparameres moderately long, widest near the base, but not at the base itself, then narrowed, the points acute, external margin sinuate, internal margin straight, the tips not recurved.

Type.—*Apolabis hottentotta* Dohrn.

This genus contains mostly Ethiopian forms, but I feel obliged to range here the Asiatic *A. marginalis*. The virga is visible in the West African *A. isomorpha* Bor., but not in the other species; the metaparameres in this species, too, are somewhat different,

being more gradually narrowed towards the tip. On these grounds, a new genus might be made for its reception, but I prefer to avoid erecting new genera unless compelled.

The præputial sacks have densely denticulate pads in several species, e.g. *A. isomorpha*, *A. hottentotta*, *A. vicina* Burr, *A. turgida* Burr, and *A. marginalis* Dohrn. They appear to be unarmed in *A. læta* Gerst.

Another species which I range here with some doubt is *A. picea* Bor. This species has the abdomen rather strongly dilated posteriorly, which led Borelli to place it in the old genus *Gonolabis*; I am glad, however, to remove it here, as its place seems more natural in a mainly Ethiopian genus, and *Gonolabis* can then be retained for Oriental species (Pl. XI, figs. 8–14).

Genus *Epilabis* g. n.

Elytra rudimentaria, ad suturum attingentia; abdomen pone medium dilatatum; sternum typicum; metaparameres sat longi, haud angustati, margine externo recto, interno undulato, apice late rotundati.

Elytra rudimentary, but meeting at the suture; abdomen moderately dilated just beyond the middle; sternum typical; metaparameres rather broad, but not narrowed towards the tips, the outer margin straight, the inner margin undulate, the tips broadly rounded; præputial sacks with small chitinous indurations; a fine virga sometimes discernible; forceps subremote.

Type.—*Epilabis penicillata* Bor.

Range.—Southern India and Ceylon.

This genus removes from the old *Euborellia* two South Indian species, *E. penicillata* Bor., which is characterized by a small tuft of bristles at the apex of the ninth sternite of the male, and *E. sisera* * Burr, which is characterized by a remarkable deep cavity in the middle of the head capsule; the latter species is much larger and more powerful than the former.

I am faced with a peculiar difficulty in this case. I have only seen two specimens of *E. sisera*, taken together in the Anamalai Mountains by Mr. T. B. Fletcher, who kindly sent them to me. Externally the two individuals are indistinguishable, but the metaparameres are not alike; in one, they closely resemble those of *E. penicillata*, of which I have several mounts. The other specimen, however, rather recalls the type seen in *Gelotolabis*; the figure shows the difference of outline; the convexity of the inner margin, which is so striking a feature of the type form, is

* Judges, iv. 21. My regretted friend, the late R. Shelford, suggests this very appropriate name.

not marked. Possibly this dimorphic form is a throw-back to a more primitive type; but it will be very interesting to find out which is the dominant form (Pl. XI, figs. 15–18).

Genus *Paralabis* g. n.

Genus alatum, brachypterum, vel apterum; metaparameres medio modice dilatati, apicem versus sensim angustati, apice ipso anguste rotundati; præputialis sæpius denticulata.

Fully-winged, brachypterous, with rudimentary elytra, or apterous; metaparameres moderately dilated about the middle, gradually narrowed towards the tips, which are narrowly rounded, the external margin regularly convex; præputial sacks usually with denticulate pads; no virga discernible.

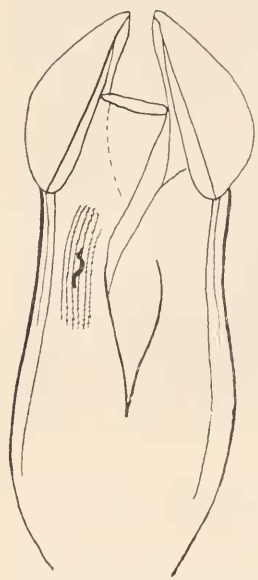


Fig. 62.—*Paralabis owenii* Burr, ♂. Genitalia.

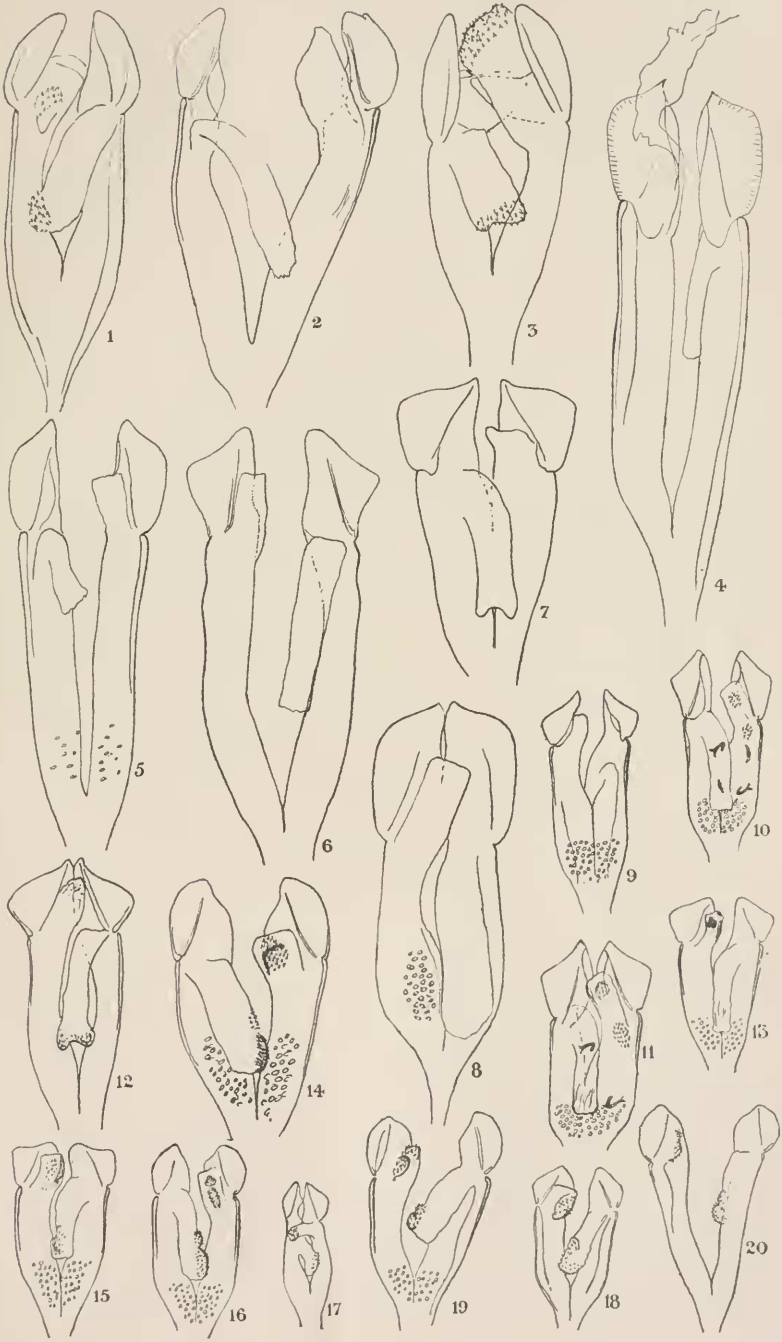
Type.—*Paralabis owenii* Burr.

This genus contains a number of heterogeneous species from different districts, which have a common form of metaparamere as described. These are *P. owenii* Burr, from Liberia, an apterous species, well characterized by the point of the ninth sternite of the male; *P. pervicina* Burr, an apterous species from Assam, which superficially resembles *Euborellia annulipes* Luc., but is a little larger and brighter in colouring; *P. greeni* Burr, from Ceylon and Southern India, in which the elytra are rudimentary, but meet along the suture; and *P. dohrni* Kirby, a fully-winged Indian and Singalese species, with a superficial resemblance to *Landex*; it is characterized by a submetallic deep blue sheen. *P. owenii* has a well-marked

EXPLANATION OF PLATE XII.

FIG.
1. *Paralabis dohrni* Kirby.
2. *P. greeni* Burr (black form).
3. *P. pervicina* Burr.
4. *Gelotolabis æthiopica* Burr.
5. *G. infelix* Burr.
6. *G. maxima* Brullé.
7. *Gonolabis oblita* Burr.
8. *G. electa* Burr.
9. *Mongolabis woodwardi* Burr.
10. *M. pacifica* Erichs.

FIG.
11. *Mongolabis brunneri* Dohrn.
12. *Mongolabis* (?) sp. (Formosa).
13. *Euborellia janeirensis* Dohrn.
14. *E. insulana* Bor.
15. *E. cincticollis* Gerst.
16. *E. debilis* Burr.
17. *E. tellinii* Bor.
18. *E. compressa* Bor.
19. *E. mœsta* Géné.
20. *E. andreinii* Bor.



[*Face p.* 540.

pad of denticulate striæ in the præputial sack; in *P. dohrni* and *P. pervicina* there is a strongly marked denticulate pad at the end of the sacks, but I cannot detect any teeth in *P. greeni*. The specimen of *P. greeni* from which I drew the mount was one of the large black race from Ceylon referred to in my Dermaptera of British India. I have an idea that when we examine the genital armature of the typical form, we shall find it of the *Epilabis* type, with which group typical *P. greeni* agrees externally very closely (Pl. XII, figs. 1–3).

Genus *Gelotolabis* Zacher.

I prefer to expand the genus *Gelotolabis* of Zacher, to neglect the absence of "Chitinverdickungen" in the præputial sack as a generic character, and to define it by the shape of the metaparameres, which are about equally broad through their length, but terminate in a small tip or snout; the outer margin is gently convex as a rule, but in *G. maxima* Brullé the convexity is more pronounced, assuming the form of an obtuse angle, which at first inclined me to make a separate genus for it. I sink here Zacher's genus *Horridolabis*, as being insufficiently characterized. His type species, *H. paradoxura*, is identical with my *Anisolabis felix*. The type of *Gelotolabis* is *G. burri* Zacher, in which I sink *G. æthiopica* Burr; other species are the allied *G. kristenseni* Burr, also from Abyssinia, and *G. infelix* Burr, from Central Africa. Thus, at present it contains only African species, and, when *G. maxima* is removed, only purely Ethiopian species (Pl. XII, figs. 4–6).

Genus *Gonolabis* Burr.

This genus is now very much reduced, only containing a few totally apterous Indo-Malayan species, in which the metaparameres, a little longer than broad, are rounded externally, and the abdomen in the male attains its greatest breadth at the tenth sclerite.

Zacher differentiates it from *Euborellia* only by the absence of teeth in the præputial sack, and the absence of any trace of rudimentary elytra, but the form of the metaparameres more closely resembles that of *Gelotolabis*; it differs from that genus in the usually smaller size of the species, in their occurrence in the Indo-Malayan province, and in the marked apical dilation of the abdomen in the male.

Zacher's *G. kükenthali* is identical with *G. javana* Bor.; I have compared the two types, and there is no doubt whatever as to their identity. *G. javana* is sharply characterized by the rather peculiar coloration, and by the keel on the ninth sternite of the

male. What has long passed for *G. javana* in collections is *oblita* Burr, which is probably what Zacher refers to under the name of *G. javana*, and perhaps also *G. electa* Burr, known from Java and Ceylon. The genitalia of the latter are figured, and it will be observed that they agree well with those of *G. javana* as figured by Zacher. Probably Zacher's identification of *G. sumatrana* is correct, as this is far less rare than *G. javana*, and has not been subject to the same confusion and mistaken identity.

If Zacher had given the dimensions, there would be no doubt in the matter, as *G. sumatrana* is a much larger creature than *G. oblita*. Zacher quotes Buitenzorg for his *G. javana*, a well-known locality for *G. oblita*, just as Fort de Kock in Sumatra is for *G. sumatrana*. His figure of *G. sumatrana* are like those of *G. oblita*; those of the authentic *G. sumatrana* are unknown.

On the assumption that under the name of *G. javana* Zacher is referring to *G. oblita*, we have only the following species now in *Gonolabis*:—

G. javana Bor., Type (= *G. kükenthali* Zacher).
G. sumatrana Bor.
G. oblita Burr (= *G. javana*, auctt. nec Bor.).
(Pl. XII, figs. 7 and 8.)

Fourth Group.

Metaparameres as broad as long, or broader than long.

This group contains a number of forms from all regions, but mainly palæotropical, more or less closely resembling each other superficially, all of rather small size, showing every stage of wing-development.

We can eliminate first the Neotropical *Heterolabis* Bor., with a well-developed virga, and *Anisolabella* Zacher, from North-Eastern Africa, with spindle-shaped antennal segments.

The remaining forms fall into two groups: those with the metaparameres externally rectangular, and those with them rounded on the outer margin. Easily separated first is *Mongolabis* Zacher, which contains a number of what were formerly ranged in *Gonolabis* —totally apterous forms, with the male abdomen dilated towards the apex; this genus contains only Oriental and Australian forms.

The remainder, with non-dilated abdomens, might be allotted to two genera, according to the outline of the metaparameres; but I prefer to regard this, provisionally at least, as a subgeneric character, and put the whole of the remainder into *Eutorellia* Burr, modified by the exclusion of *E. sisera*, *E. greeni*, *E. penicillata*, etc., and by the inclusion of the apterous *E. annulipes* Luc., *E. incisa* Bor., *E. compressa* Bor., and the fully-winged *E. jancirensis* Dohrn.